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*Comm. in Asteroseismology*  
 Vol. 155, 2008

## Preface

At the time of the definition of the deliverables for the HELAS network activity NA5: Asteroseismology, a consultation was done within the European asteroseismology community during CoRoT Week 9 in December 2005 at ESA/ESTEC. The majority of asteroseismologists present at that meeting were in favour of developing a software tool for the identification of kappa-driven oscillation modes in main-sequence stars, from multi-colour photometry and/or high-resolution spectroscopy. It was felt that the need for such a type of tool was much greater than for any other one, given that such a package is not available while various frequency analysis and modelling tools were already offered. Ideally, a database of time series for mode identification would come along with such a package, so that newcomers in the field of asteroseismology (at Master, PhD or even postdoc level) as well as lecturers would have a complete toolkit for mode identification at their disposal.

The current special volume of *Communications in Asteroseismology* provides the user manuals of both released tools. We present the manuals of the *Database for AsteroSeismology* (DAS) which was defined and implemented by Dr. Roy Østensen and of the *Frequency Analysis and Mode Identification for AsteroSeismology* (FAMIAS) developed by Dr. Wolfgang Zima, both at the Institute of Astronomy of Leuven University, which is the lead institute of the HELAS Workpackage NA5. Both authors have committed to maintain and update DAS and FAMIAS for the whole duration of HELAS.

We refer to the NA5 website<sup>1</sup> for additional HELAS NA5 asteroseismology deliverables prepared by the Porto and Wrocław teams. It concerns grids of non-adiabatic observables, atmospheric model parameters, grids of stellar models and isochrones as well as their frequencies of oscillation, and, finally, model comparison tools and documentation.

We hope that this ensemble of asteroseismology tools is of use for the community.

Conny Aerts, Chairwoman of NA5, Leuven, 15 August 2008.

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<sup>1</sup><http://www.ster.kuleuven.be/~zima/helasna5/>

*Comm. in Asteroseismology*  
*Vol. 155, 2008*

# DAS User Manual

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# 1. HELAS Database for AsteroSeismology

## 1.1 Introduction

The HELAS Database for AsteroSeismology (DAS) is one of the deliverables of the Work Package NA5: Asteroseismology of the European Coordination Action in Helio and Asteroseismology (HELAS<sup>1</sup>). The DAS aims to provide easy access to publicly available asteroseismological timeseries data, both photometric and spectroscopic. In particular, the DAS and the HELAS software package FAMIAS are ideally suited to train Master and PhD students in asteroseismic data analysis and to build longterm datasets. The number of stars in the system is still limited and reflects the willingness of data owners to provide their data after publication. Work continues to populate the database with contributions from the community, and at present the number of stars in the database is 82 (Tables 1 and 2).

## 1.2 Features

Before getting access to the database, the user must agree to the conditions of use, which obliges the user to refer to a source publication provided with each dataset, whenever archive data is used in an article. The database search interface (Figure 1) includes search by variable class, name or coordinates. Output tables (Figure 2) are generated in HTML with links to automatically generated finding charts, the Aladin viewer, and a detailed data sheet (Figure 3) that displays catalogue data for each target, together with a DSS image of the source. All stars have been added with a number of identifiers including the common or constellation name, HD catalog number, Hipparcos number, BD catalog name and others, making it easy to find a particular star in the database. The database currently recognises 15 different classes of variable stars, but not all classes have any entries yet. Table 3 provides the keys to the variable star classes used in the database (and in Tables 1 and 2), and also summarises the total number of stars in each class.

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<sup>1</sup><http://www.helas-eu.org>

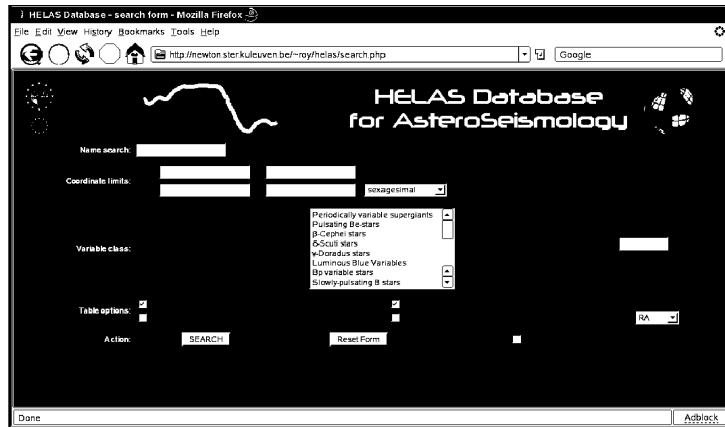


Figure 1: The database search interface.

### 1.3 Archive data

At the bottom of the data sheet, a table is generated with all datasets for this star in the database (see Figure 3 for an example). Each dataset is associated with a type identifier, usually 'spectra' or 'rv' to distinguish between sets that contain actual spectroscopy (usually a small section of a high resolution spectrum or several lines combined into one) or radial velocities derived from spectroscopy. Photometric datasets have also been included, and since they can be very different in nature, they have been given different identifiers such as 'most', 'ultracam', 'geneva', 'wet' and so on. In Table 1, several stars with both spectroscopic and photometric data are listed.

### 1.4 Referencing

With each dataset entry, there is an associated README file, which, in addition to describing the format of the data provided, gives one or more references to articles that use and describe the dataset. This reference, or the most important one if there are several, is also provided in the data table as a link that will lead to the relevant paper. The final entry in the dataset table is a link to the actual dataset, normally a compressed TAR-file. The dataset can contain either tables of timeseries data or in the case of spectra, individual files for each measurement. The README-file is always included in the archive file.

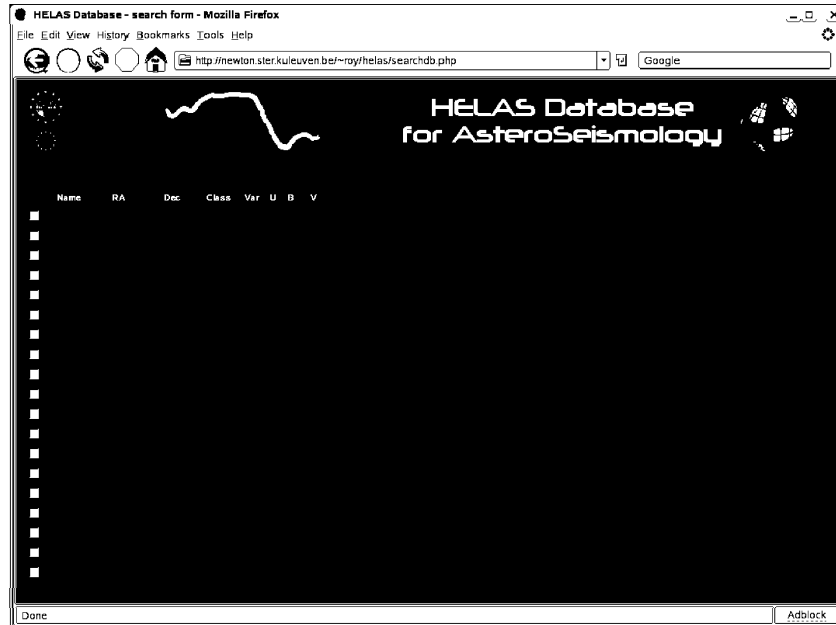


Figure 2: The result of a search for  $\beta$  Cephei stars in the database.

## 1.5 Platform

The database runs under MySQL ([www.mysql.com](http://www.mysql.com); an open source database) with interfaces in Perl for uploading the database entries. The WWW interface uses HTML forms and tables generated by PHP. The DAS is hosted at <http://newton.ster.kuleuven.be/~roy/helas/> and also available from the HELAS platform<sup>2</sup> through the NA5 website link.

## 1.6 Call for Contributions

Anybody who wishes to contribute published data, spectroscopic or photometric, on any particular star, is kindly asked to contact the author by e-mail to [roy@ster.kuleuven.be](mailto:roy@ster.kuleuven.be).

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<sup>2</sup><http://www.helas-eu.org>

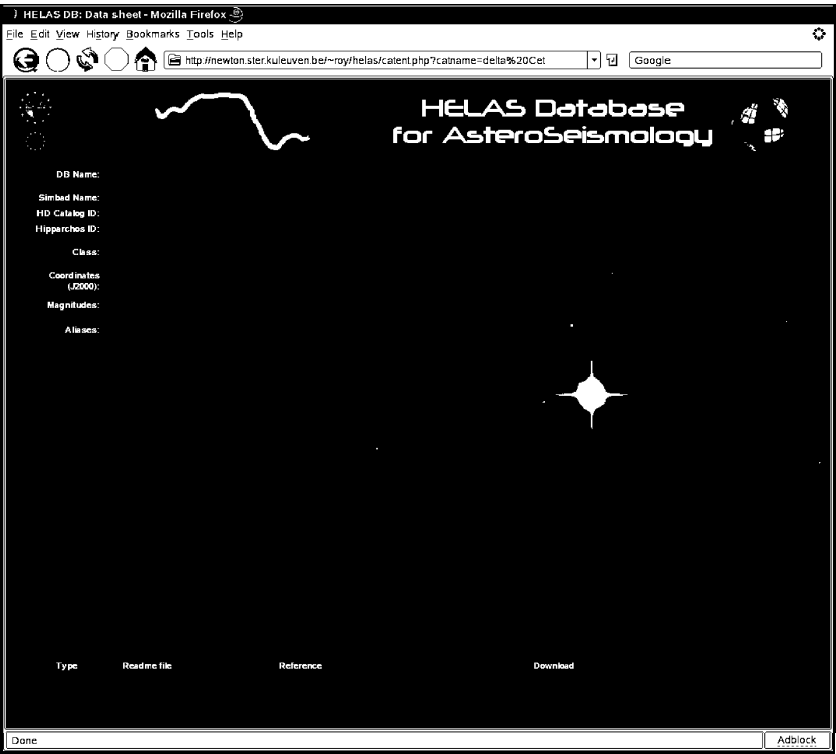


Figure 3: An example data sheet, here for the  $\beta$  Cep star  $\delta$  Ceti.

Acknowledgements

RØ has been supported by the FP6 European Coordination Action HELAS and by the Research Council of the University of Leuven under grant GOA/2003/04.



Table 1: Variable stars with data in the DAS.

DB name	HD number	Class	Data type
HD 215	HD 215	GDOR	geneva
HD 277	HD 277	GDOR	geneva
EK Psc		SDBV	ultracam
V746 Cas	HD 1976	SPB	geneva
HD 2842	HD 2842	GDOR	geneva
53 Psc	HD 3379	SPB	geneva
PG 0101+039		SDBV	most
HD 7169	HD 7169	GDOR	geneva
FO Cet	HD 12901	GDOR	spectra, geneva
V354 Per	HD 13745	SPB	geneva
V473 Per	HD 13831	BCEP	geneva
HD 14053	HD 14053	BCEP	geneva
delta Cet	HD 16582	BCEP	spectra, most
53 Ari	HD 19374	SPB	geneva
V576 Per	HD 21071	SPB	geneva
IP Per	HD 278937	DSCUT	multisite
HD 23874	HD 23874	GDOR	geneva
tau08 Eri	HD 24587	SPB	spectra
DO Eri	HD 24712	WR	wet
V1133 Tau	HD 25558	SPB	geneva
GU Eri	HD 26326	SPB	spectra
V1143 Tau	HD 28114	SPB	geneva
V1144 Tau	HD 28475	SPB	geneva
nu Eri	HD 29248	BCEP	spectra
V350 CMa	HD 48501	GDOR	spectra, geneva
V450 Car	HD 53921	SPB	spectra
MM CMa	HD 55522	BPV	spectra
DO Lyn	HD 62454	GDOR	geneva
rho Pup	HD 67523	DSCUT	spectra
NO Vel	HD 69144	SPB	spectra
EF Lyn	HD 69715	GDOR	geneva
YZ Pyx	HD 71913	BCEP	geneva
HY Vel	HD 74560	SPB	spectra
omicron Vel	HD 74195	SPB	spectra
HD 74504	HD 74504	GDOR	geneva
V335 Vel	HD 85953	SPB	spectra
HD 86358	HD 86358	GDOR	geneva
23 Sex	HD 89688	BCEP	geneva
V514 Car	HD 92287	SPB	spectra
xi Hya	HD 100407	SLR	rv
V863 Cen	HD 105382	BPV	spectra

Table 2: Variable stars (cont'd.)

DB name	HD number	Class	Data type
HD 105458	HD 105458	GDOR	geneva
FG Vir	HD 106384	DSCUT	spectra
DD CVn	HD 108100	GDOR	geneva
KZ Mus	HD 109885	BCEP	geneva
beta Cru	HD 111123	BCEP	spectra
MP Com	HD 113867	GDOR	geneva
V869 Cen	HD 123515	SPB	spectra
alfa Cen B	HD 128621	SLR	rv
V1019 Cen	HD 131120	BPV	spectra
FK Boo	HD 138003	SPB	geneva
IU Lib	HD 138764	SPB	spectra
d Lup	HD 138769	BPV	spectra
PT Ser	HD 140873	SPB	spectra
epsilon Oph	HD 146791	SLR	rv
zeta Oph	HD 149757	BE	most
J1717+5805		SDBV	ultracam
V2371 Oph	HD 157485	BCEP	geneva
lambda Sco	HD 158926	BCEP	spectra
kappa Sco	HD 160578	BCEP	spectra
HD 163830	HD 163830	SPB	most
HD 163899	HD 163899	PVSG	most
V3984 Sgr	HD 163868	BE	most
V4382 Sgr	HD 165812	BCEP	geneva
V1402 Aql	HD 177230	WR	most
V4198 Sgr	HD 177863	SPB	spectra
V338 Sge	HD 169820	SPB	geneva
V1449 Aql	HD 180642	BCEP	geneva
2 Vul	HD 179588	SPB	geneva
ES Vul	HD 180968	BCEP	geneva
V4199 Sgr	HD 181558	SPB	spectra
V377 Vul	HD 182255	SPB	geneva
V1473 Aql	HD 191295	SPB	geneva
BW Vul	HD 199140	BCEP	spectra
SY Equ	HD 203664	BCEP	geneva
beta Cep	HD 205021	BCEP	spectra
HD 206540	HD 206540	SPB	geneva
16 Peg	HD 208057	SPB	geneva
10 Lac	HD 214680	BCEP	geneva
xi Oct	HD 215573	SPB	spectra
EN Lac	HD 216916	BCEP	spectra
V394 And	HD 222555	SPB	geneva

Table 3: Variable star classes used in the DAS.

Class	Reference	Total
PVSG	Periodically variable supergiants	1
BE	Pulsating Be-stars	2
BCEP	$\beta$ -Cephei stars	19
DSCUT	$\delta$ -Scuti stars	3
GDOR	$\gamma$ -Doradus stars	14
LBV	Luminous Blue Variables	0
BPV	Bp variable stars	4
SPB	Slowly-pulsating B stars	30
SLR	Solar-like oscillations in red giants	3
SDBV	Pulsating subdwarf B stars	3
DAV	Pulsating DA white dwarfs	0
GWVIR	GW-Virginis stars	0
ROAP	Rapidly oscillating Ap stars	0
WR	Wolf-Rayet stars	2
CV	Cataclysmic variables	0